WHAT IS CLAIMED IS:

1. A method for producing a silicon carbide sintered body, comprising the steps of:

preparing a slurry by dispersing silicon carbide powder in a solvent;

forming a molded body by pouring the slurry into a mold and effecting calcination for the slurry in a vacuum atmosphere or in an inert gas atmosphere; and

sealing pores within the calcined molded body by impregnating the pores with high purity metal silicon molten by heating, and allowing the high purity metal silicon and carbon contained in the molded body to react on each other in the pores so as to produce silicon carbide.

2. A method for producing a silicon carbide sintered body according to claim 1, wherein an average grain size of silicon carbide powder is 0.01 to 10μm.

3. A method for producing a silicon carbide sintered body according to claim 1, wherein the silicon carbide powder is obtained by a process for preparing silicon carbide powder, which process comprises the steps of: producing silicon carbide powder by homogeneously mixing a silicon source comprising at least one selected from tetraalkoxysilane and polymers of tetraalkoxysilane, each should be of high purity, and a carbon source comprising an

organic compound of high purity which generates carbon upon heating, and heating and firing the mixture in a non-oxidizing atmosphere; and effecting post-treatment in which heat treatment with the obtained silicon carbide powder being basically kept at a temperature from equal to or higher than 1,700℃ to lower than 2,000℃ and being heated at a temperature between 2,000℃ and 2,100℃ for 5 to 20 minutes is carried out at least once during the step.

4. A method for producing a silicon carbide sintered body according to claim 3, wherein the silicon source is a polymer of tetraalkoxysilane and the carbon source is a phenol resin.

5. A method for producing a silicon carbide sintered body according to claim 1, wherein the silicon carbide powder has impurity elements of which each content is 0.5 ppm or less.

6. A method for producing a silicon carbide sintered body according to claim 1, wherein the step of calcination is carried out at 1500 to 1900°C.

7. A method for producing a silicon carbide sintered body according to claim 1, wherein a carbon content of an organic substance impregnated in the molded body in the step of calcination is 10 to 30%.

8. A method for producing a silicon carbide sintered body according to claim 1, wherein a substance which forms a nitrogen source is added in any one of the step of preparing the slurry and the step of forming the molded body.

9. A silicon carbide sintered body obtained by a method for producing a silicon carbide sintered body, which method comprises the steps of:

preparing a slurry by dispersing silicon carbide powder in a solvent;

forming a molded body by pouring the slurry into a mold and effecting calcination for the slurry in a vacuum atmosphere or in an inert gas atmosphere; and

sealing pores within the calcined molded body by impregnating the pores with high purity metal silicon molten by heating, and allowing the high purity metal silicon and carbon contained in the molded body to react on each other in the pores so as to produce silicon carbide.

10. A silicon carbide sintered body according to claim 9, wherein a total content of impurity elements is 10 ppm or less.

11. A silicon carbide sintered body according claim 9, wherein the silicon carbide sintered body has a density of 2.9 g/cm^3 or higher.